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# Mode d'emploi

## Modular Heating Mantle

## SYMBOL KEY

MEANING	SYMBOL	MEANING	SYMBOL
This symbol means that the user must refer to the Operating Instructions.		This symbol cautions the user that there are hot zones on the equipment enclosure as depicted.	
This symbol adjacent to an indicator lamp means mains power On/Off when lamp illuminated / non-illuminated.		This symbol adjacent to an indicator lamp means heater power Off/On when lamp non-illuminated/illuminated	
This symbol adjacent to the stirrer indicator means stirrer is On/Off when lamp illuminated / non-illuminated.		Up key, for increasing set-point % power, or set-point temperature	
Down key, for decreasing set-point % power, or set-point temperature		Clear/Stop/Reset key	

**MODULAR HEATING MANTLE**  
**OPERATING AND SAFETY INSTRUCTIONS**

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## 1. INTRODUCTION:

The Modular series of mantles has been designed to provide a comprehensive answer to heating fluids in round bottom flasks in the modern laboratory. It combines the traditional flexible resistance heating element with heating control & temperature feedback control, stirring control, and interchangeable heating cartridges.

Heating control is provided either by solid state energy regulator circuitry or with temperature feed-back PID control when the temperature feedback probe is fitted.

Depending on the mode of operation, the display allows either the % energy setting or the set point temperature / fluid temperature to be monitored.

The product is modular in design with a main controller unit, stirrer module unit and plug-in heater cartridge options. The main controller case and stirrer module case are injection moulded ABS flame-retardant thermoplastic. The Heater cartridge case is spun aluminium, with a robust polyester powder paint coating.

The fascia labels are Polyester film.

**Warnings (\*\*)** given in these Operating Instructions identify conditions and actions that pose hazards to the user.

It is therefore recommended that the Responsible Body for the equipment reads these Operating Instructions and Safety Information and that the User(s) are suitably trained before using the equipment.

Les avertissements (\*\*) qui figurent dans ce manuel d'instructions signalent des situations et des actions qui présentent un risque pour l'utilisateur.

Il est donc recommandé que l'autorité responsable de l'équipement lise ce manuel, ainsi que les consignes de sécurité, et que le ou les utilisateurs reçoivent une formation appropriée avant d'utiliser l'équipement.

## 2. SAFETY INFORMATION

This product has been designed for safe operation when in normal use and operated in accordance with manufacturers instructions.

### **WARNING**

**\*\* This equipment is classified as Class O (IEC519: Part 2) with regard to over-temperature protection and should be used accordingly.**

**\*\* Always follow good laboratory practice when using the equipment and give due recognition to your company's safety procedures and the health and safety and associated legislation applicable to your areas of operation. Check laboratory procedures for substance being heated to ensure that any hazards (e.g. explosion, implosion or the release of toxic or flammable gases) that might arise, have been suitably addressed before proceeding. When heating certain substances, the liberation of hazardous gases may require the use of a fume cupboard or other extraction system.**

**\*\* Ensure equipment is used on clean, dry, non-combustible work surface with suitable clearance from other equipment.**

**\*\* Do not touch the heating element or any vessel whilst in use.**

**\*\* Do not lean or stretch over equipment, glassware and fixings protruding from top could be broken or cause injury.**

**\*\* The equipment is not spark, flame or explosion proof and has not been designed for use in hazardous areas in terms of BS 5345. Keep flammable, low flash point substances away from the apparatus.**

**\*\* Do not spill substances onto the mantle. If spillage does occur, disconnect unit from mains supply and follow instructions detailed at Equipment Maintenance.**

- \*\* Do not cover the mantle whilst in use or leave it switched on without a charged flask.**
- \*\* Do not thermally insulate the exposed upper section of the vessel, as the insulation used may obstruct the convection cooling airways around the rim of the mantle enclosure and cause the mantle to overheat.**
- \*\* It is not recommended to leave any heating apparatus unattended during operation. This equally applies to this equipment.**
- \*\* Only use fit-for-purpose spares and accessories as specified in section 8.**
- \*\* Do not remove the heater cartridge from the unit whilst power is applied to the controller.**

#### **AVERTISSEMENT**

- \*\* Cet équipement appartient à la Classe O (IEC519: Partie 2) en ce qui a trait à la protection contre la surchauffe et doit être utilisé en conséquence.**
- \*\* Veuillez adopter de bonnes pratiques de travail en laboratoire lors de l'utilisation de l'équipement et prêter toute l'attention nécessaire aux consignes de sécurité de votre entreprise et aux règlements en matière de santé et de sécurité qui sont en vigueur dans la zone d'exploitation. Consultez les règles de laboratoire portant sur les substances chauffées afin de vous assurer que les risques éventuels (explosion, implosion, dégagement de vapeurs toxiques ou inflammables) aient reçu toute l'attention requise avant de commencer les travaux. Lors du chauffage de certaines substances, la libération de gaz dangereux peut nécessiter l'utilisation d'une hotte de laboratoire ou de dispositifs de ventilation.**
- \*\* Assurez-vous que l'équipement est utilisé sur une surface de travail propre, sèche et incombustible, de même qu'à une distance suffisante des autres appareils.**
- \*\* Ne touchez jamais à l'élément chauffant ou au récipient pendant l'utilisation.**
- \*\* Évitez de vous pencher ou de vous étirer au-dessus de l'équipement, au risque de casser certaines pièces ou accessoires de verrerie sortant du dessus de l'appareil et de vous blesser.**
- \*\* Cet équipement n'est ni à l'épreuve des étincelles, des flammes ou des explosions et n'est pas conçu pour servir dans des zones dangereuses, telles que définies selon la norme BS 5345. Éloignez de l'appareil toute substance inflammable ou à faible point d'éclair.**
- \*\* Ne versez aucune substance sur le boîtier. En cas de déversement, coupez l'alimentation principale de l'appareil et suivez les instructions d'entretien.**
- \*\* Ne couvrez pas le boîtier pendant l'utilisation et ne laissez pas l'appareil en marche s'il ne contient aucun flacon rempli.**
- \*\* N'appliquez pas d'isolant thermique sur le dessus du flacon exposé. Cet isolant risque d'obstruer les fentes de refroidissement par convection disposées au bord du boîtier, ce qui le ferait surchauffer.**
- \*\* Il est toujours déconseillé de laisser un appareil chauffant sans surveillance pendant son fonctionnement. Cette règle s'applique également à cet équipement.**
- \*\* N'utilisez que les pièces de rechange et les accessoires appropriés, tel qu'indiqué au chapitre 8.**
- \*\* Ne retirez pas la cartouche de chauffage de l'appareil si le contrôleur est sous tension.**

**NOTE:** If this product is not used in accordance with manufacturer's Operating Instructions then the basic safety protection afforded by the equipment may not be preserved and the guarantee will be invalidated.

### 3. INSTALLATION INSTRUCTIONS

3.1 The equipment is Installation Category (Over Voltage Category) Class II with regard to protection against electric shock (IEC664 Sub-clause 5.6).

3.2 Environmental Conditions: Indoor use only; temperature 5°C to 40°C; 80% RH max.; mains voltage supply fluctuations not to exceed  $\pm 10\%$ .

3.3 This equipment must be connected to a fixed earth (grounded) mains socket outlet. See Technical Specification for section for recommended fuse rating.

3.4 Ensure that the correct equipment fuse and mains lead fuse are fitted for the supply used. Check the voltage rating on the product data label, ensure the rating conforms to the local supply.

3.5 The surface of the heating element will, on receipt, be slightly discoloured. This discoloration is normal and occurs when the element carrier material is first heated.

3.6 It is recommended that for normal use the appliance should be connected to a mains supply source which incorporates a RCD or GFCI. The RCD or GFCI Residual Current Device cuts off power to the equipment immediately it detects a current leakage fault. For example, cutting off power when there is an accidental liquid spillage in a mantle protected with an earth (ground) screen.

3.7 If the unit is supplied without a fitted mains plug the colour coding of the mains cable is:

Green/Yellow	or Green	=	Protective Earth (Ground)
Blue	or White	=	Neutral
Brown	or Black	=	Line (Hot Line)

3.8 Screw the rod support in the controller unit, threaded rod support socket ( located at the top of the controller fascia ). Secure the charged flask to the rod support using appropriate clamp and flask supports .

### 3.9 ENVIRONMENTAL PROTECTION

It is Electrothermal policy to give consideration to environmental issues in design and manufacturing without compromising end product performance and value to customers.

- Packaging materials have been selected such that they may be sorted for recycling.
- For other recycling, see Technical Section 5.6. for Main Enclosure Materials etc.

### 4. EQUIPMENT OPERATION

At power on, the unit self-tests the display by lighting all segments on the display ( displays **888** - immediately apparent before use if any display segments have failed).

The unit then displays the firmware revision number (i.e. **102** – revision 1.02 ).

The normal display mode is then entered –

If the stirrer thumb-wheel speed control is in the **on** range, the display will show the stirrer rpm set-point as a shimmering display ( i.e. **527** ) for several seconds.

To adjust the stirrer, rotate the stirrer thumb-wheel speed control in the **on** range ( other than the zero '0' position ), the stirrer rpm set-point is shown as a 'shimmering' display (i.e. **527** ). The rpm is only displayed when the control thumb-wheel is rotated quickly or in the initial switch-on sequence.

If a thermometer probe is detected, temperature set-point and actual thermometer temperature are displayed alternately. The set-point temperature is indicated by all decimal points being lit, and the actual temperature display has **no** decimal points lit. At switch-on set-point will be **. 0** and actual thermometer temperature i.e. ambient **20**

If no thermometer is detected, the display will show alternately a ' % ' sign and the power set-point as a percentage i.e. **. 0** at switch-on.

#### 4.1 Heater control

4.1.1 With the mantle switched off (Mains lead disconnected from power source, Power indicator I/O off) place a charged, clean and dry vessel of the size indicated on the label, on the mantle. Wherever possible the vessel should be supported within the mantle by means of a support rod and clamp.

4.1.2 If temperature feedback control is required, plug the temperature probe into the DIN socket located adjacent to mains-in socket on the controller unit, and position / clamp the probe such that the probe tip is immersed in the fluid away from the flask walls.

4.1.3 Switch power on - ( Connect Mains lead to socket at rear of controller unit, and to power socket. Switch power-on - I/O power indicator will illuminate on controller fascia ). Wait for end of display test 888 sequence and software revision number. At the alternating % & . 0 display, adjust controller to the required % energy setting using up/down keys, or if probe connected adjust set-point temperature using up/down keys on controller main fascia.

4.1.4 When processing is complete, switch off the mains supply at the socket and disconnect the Mains lead from the power supply (I/O power indicator off) before removing the vessel.

4.1.5 To return the mantle power to zero (0% power or 0 deg C set-point) at any time, press the stop key ( positioned at the bottom of the controller unit fascia.

#### 4.2 Stirring control

A thumb-wheel is used to control the speed of the stirring module, providing Uni-directional stirring up to 800 rpm.

4.2.1. Carefully place the stirrer bar provided into the vessel and turn the rotational speed control to OFF ( O - setting).

4.2.2. Switch the stirrer unit on. The indicator lamp will be illuminated.

4.2.3. Adjust the rotational speed by means of the thumb-wheel speed control knob. Should the stirring action be lost by over-rotation, then reduce the stir speed to minimum, switch the stirrer off ' 0 ' position, wait for the stir bar to come to rest and turn the control knob to the on position slowly increase the stir speed.

### 5. TECHNICAL SPECIFICATION

5.1.1	Mains Power Supply:	230V 50Hz,
5.1.2	Mains lead/Plug and lead Set:	3 core 2 metres long.
5.1.3	Power Consumption:	See 5.10
5.1.4	Fuse rating:	See 5.10

#### 5.2 Product configuration details

230 Volts	Description
OMCA	Controller with Stirrer
OMCA0250	Controller with Stirrer and Mantle (250ml size)
OMCA0250T	Controller with Stirrer and Mantle (100ml-250ml size)
OMCA0500	Controller with Stirrer and Mantle (500ml size)
OMCA1000	Controller with Stirrer and Mantle (1000ml size)
OMCA1000T	Controller with Stirrer and Mantle (500ml-1000ml size)

5.3 Fuse: 20mm x 5mm Glass  
Quick-blow (F).

5.4 Operating Ambient Temperature: 5°C to 40°C.  
5.5 Heating Element Temperature: 450 °C maximum.

#### 5.6 Enclosure Construction:

Flame-retardant Injection moulded ABS Thermoplastic  
Controller housing & Stirrer Module housing.  
Polyester powder-paint coated aluminium Heater Cartridge  
 housings.  
Polyester film Fascia Labels.  
The ABS is resistant to strong alkalis, but will be attacked  
by acids & solvents.  
Polyester paint and film are resistant to acids, but will be  
attacked by alkalis & solvents

5.7 Thermal Insulation: Mineral Wool.  
5.8 Clamps for Support rods: 1/2" (12.7mm) dia (max).

#### 5.9 Dimensions & Weight (unpacked)

Length 10.2" (258mm)  
Width 11.8" (300mm)  
Height 6.9" (175mm)

Weight 6.3lb (2.85Kg)

#### 5.10 Power Consumption and Fuse Ratings

Cartridge Size	Total Power (W) 230V	Fuse Rating (A) 230V	Fuse Part No.
250ml	200	2.5A	AZ9040
1000ml	300	2.5A	AZ9040



## 6. MAINTENANCE

The equipment is classified as Class I (ref. IEC536: 1976) with regard to protection against electric shock.

### WARNING

**\*\* Unplug equipment from mains supply and allow to cool before undertaking any maintenance tasks.**

**\*\* Maintenance should only be carried out under the direction of the Responsible Body, by a competent electrician.**

### AVERTISSEMENT

**\*\* Coupez l'alimentation principale de l'appareil et laissez-le refroidir avant d'en effectuer l'entretien.**

**\*\* Sous la direction de l'autorité responsable, ne confiez l'entretien qu'à un électricien compétent.**

With proper care and operation the mantle should give reliable service. Contamination, or general misuse will however reduce the effective life of the product and may cause a hazard.

Maintenance for the equipment should include:

- Periodic electrical safety testing (an annual test is recommended as a minimum requirement).
- Regular inspection for damage with particular reference to the mains lead and plug/socket.

Preventive maintenance for the equipment should include keeping the unit clean and protecting it from spillage, contamination or corrosive environments.

**\*\* DO NOT USE SOLVENTS FOR CLEANING ANY PART OF THE EQUIPMENT.**

**\*\* If the equipment has been exposed to spillage or contamination, then the Responsible Body is responsible for carrying out appropriate decontamination if hazardous material has been spilt on or inside the equipment. Decontamination should only be undertaken under the control of the Responsible Body with due recognition of possible hazards that may ensue. Before using any cleaning or decontamination method, the Responsible Body should check with the manufacturer that the proposed method will not damage the equipment.**

**\*\* N'UTILISEZ AUCUN SOLVANT POUR NETTOYER L'UNE OU L'AUTRE DES PIÈCES DE L'APPAREIL.**

**\*\* Si l'équipement est exposé à un déversement ou à une contamination, il revient à l'autorité responsable d'effectuer la décontamination appropriée, que le produit dangereux ait été renversé à l'intérieur ou à l'extérieur de l'appareil. La décontamination ne doit être entreprise que sous la surveillance de l'autorité responsable et en parfaite connaissance des risques éventuels. Avant de recourir à toute méthode de nettoyage ou de décontamination, l'autorité responsable devrait s'assurer auprès du fabricant que ladite méthode ne risque pas d'endommager l'appareil.**

### 6.1 Procedure in the event of a Spillage or Flask breakage, for Non-Hazardous Material only.

If the heater cartridge comes into contact with liquids in cases of flask breakage or light spillage, the procedure is:

- 6.1.1 Disconnect the mantle from the electrical supply.
- 6.1.2 Heater cartridge should be removed from the mantle when cool to touch. See 6.2
- 6.1.3 Remove any broken glass or solids from the heater element.
- 6.1.4 Place the heater cartridge in a low temperature oven at 60-80 ° C in order to evaporate the spilled fluid.

**\*\* Carry out oven drying procedure only after ensuring no low flash point substances are present with respect to 60-80° C drying temperature.**

**\*\* N'effectuez le séchage du four qu'après vous être assuré qu'aucune substance à faible point d'éclair n'est présente, compte tenu d'une température de séchage de 60 à 80 °C.**

- 6.1.5 Replace the cartridge.  
Prior to further use, the Responsible Body shall check the electrical safety of the mantle. Only if all safety requirements are met can the mantle be used again.  
The above procedure is intended as a guide. Should spillage occur with a toxic or hazardous fluid then special precautions may be necessary (see 6).

### 6.2 Replacing the heater cartridge

In the event of a heater element becoming damaged or open circuit , or simply that a different heater cartridge format is required , the following procedure should be adopted for its replacement.

- 6.2.1 Unplug or disconnect the mantle from the power source.
- 6.2.2 When cool to touch, grasp the sides of the heater cartridge with both hands and gently/firmly ease the cartridge upwards away from the main controller module. The power and data connections will disengage automatically as the cartridge is lifted away from the controller interface. The power connection provides a safe & simple means of interchanging heater cartridges.  
Place the cartridge on a clean & dry work surface.  
The base of the cartridge, which interfaces with the mating part of the controller housing, has 3 locating slots which orientate and key the cartridge into position on receptor ribs in the controller interface.
- 6.2.3 The replacement cartridge can now be fitted. Grasp the cartridge in both hands and rotate over the controller receptor until the power & data connectors and the key slots are roughly in line with their mating interface.
- 6.2.4 Lower and ease the cartridge into position , locating the key slots & ribs and the connectors. Fully locate the cartridge into position by pushing gently/firmly downwards with both hands.
- 6.2.5 The responsible body shall check the electrical safety of the unit before further use.

### 6.3 Replacing the stirrer module

In the event of the stirrer module becoming damaged and requiring replacement or the need to attach a stirrer module to the unit, the following procedure applies.

- 6.3.1 Follow instructions 6.2.1 to 6.2.2 to disconnect power and remove heater cartridge.
- 6.3.2 Turn the controller unit upside down and place on clean/dry work surface. Ensure the control fascia is protected from mechanical damage.
- 6.3.3 Use a cross-tip screw driver to remove the central fixing screw located in the mid-body of the stirrer case. Then carefully remove the remaining fixing screws securing the 2 side stirrer body fixing lugs to the controller base plate – the stirrer unit is now free to move, secured to the controller only by its connecting lead and snap-on connectors.
- 6.3.4 Carefully lift the stirrer module away from the base plate, exposing the two bulk-head connectors on the base plate. Gently and firmly ease the stirrer module connectors off the mating bulk-head receptors, taking care not to apply undue tension to the connecting wire.
- 6.3.5 Remove the stirrer module, place on clean/dry work surface. The two connectors are different formats eliminating the possibility of wrong re-connection.
- 6.3.6 The replacement stirrer module can now be fitted. The fitting procedure is the reverse of 6.3.1 to 6.3.5
- 6.3.7 The responsible body shall check the electrical safety of the unit before further use.

## **7. SERVICE INFORMATION**

**7.1** For Service or Technical Assistance contact the local distributor where the unit was purchased. Any unit returned for service/maintenance should be accompanied by a completed Decontamination Certificate prior to any work being undertaken. Copies of the Certificate are available from Distributor/Manufacturer.

## **8 SPARE PARTS & ACCESSORIES**

### **8.1 Spare Parts**

<b>CAT No.</b>	<b>Description</b>
OM0250	Mantle Cartridge 250ml size
OM0500	Mantle Cartridge 500ml size
OM1000	Mantle Cartridge 1000ml size
OM0250T	Mantle Cartridge 200ml-250ml size
OM01000T	Mantle Cartridge 500ml-1000ml size
OMA	Stirrer Module
OMC	Control Module
AZ9040	Fuse 2.5A 20mm x 5mm Glass Quick-blow (Pack 10)

### **8.2 Accessories**

AZ9149. GFCI Ground Fault Circuit Interrupter 125v. 60Hz. 15A

## LIST OF REFERENCES

1. **BS5345** Codes of Practice for selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres.
2. **IEC664** Guide to insulation co-ordination within low voltage systems including clearances and creepage distances for equipment.
3. **IEC536** Memorandum. Construction of electrical equipment for protection against electric shock.
4. **BS EN 61010-2-010: 1995** Safety requirements for electrical equipment for measurement, control and laboratory use. Part 2. Particular requirements.
5. **CAN/CSA - C22.2 No. 1010.1-92** Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements.
6. **CAN/CSA - C22.2 No. 1010.2.010-94** Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.
7. **EN50082** Electromagnetic compatibility. Generic Immunity standard.  
**EN50082-1:1992** Residential, commercial and light industry.
8. **FCC15 Class A - ANSI C63.4** Electromagnetic interference Part 15 low powered emitters of radio frequency energy between 9KHz and 40GHz. US and Canada.
9. **IEC519**: Safety in electro-heat installations - Part 2: particular requirements for resistance heating equipment.
10. **EN55014**: Specification for limits and methods of measurement for radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus.